

AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all prior listings, and all prior versions, of claims in the application.

LISTING OF CLAIMS:

1. (Currently Amended) A medical imaging diagnostic apparatus that obtains image data from a blood vessel of an object being examined and measures the composite thickness of a tunica intima and a tunica media of the blood vessel, comprising:

~~—extraction means for extracting the tunica intima and the tunica externa of the blood vessel based on the brightness value of the image data;~~

~~controlling means for measuring a composite thickness of the tunica intima and the tunica media of the blood vessel on a region of the tunica intima and a region of the tunica externa, and~~

~~setting means for setting reference points of the tunica intima or the tunica externa of the blood vessel based on the brightness value of the respective regions and for setting a threshold of a subtraction of the extracted brightness value of the image data from the brightness value of the reference points,~~

~~wherein in the composite thickness of the tunica intima and the tunica media of the blood vessel is measured based on their reference points and the threshold~~
brightness distribution acquisition means for acquiring a brightness distribution in the thickness direction of a blood vessel wall in a tomogram with regard to the blood vessel,

setting means for setting the tunica intima reference point and the tunica externa reference point based on the brightness distribution,

extraction means for extracting pixels, with respect to each pixel in a setting range including the tunica intima reference point or the tunica externa reference point, wherein the brightness belongs to the setting range, and

calculation means for calculating a distance between a boundary in the blood vessel wall side in a region formed by the pixels being extracted based on the tunica intima reference point and a boundary in the lumen side in a region formed by the pixels being extracted based on the tunica externa reference point.

2. (Cancelled).

3. (Previously Presented) The medical imaging diagnostic apparatus according to claim 1, comprising means to make the threshold value variable.

4. – 5. (Cancelled).

6. (Currently Amended) The medical imaging diagnostic apparatus according to claim 1, wherein:

the setting means sets ~~the~~a first region of interest in the position equivalent to the lumen, and ~~the~~sets a brightness difference between ~~the~~an average brightness within the first region of interest and the brightness of the tunica intima reference point as ~~the~~a threshold, and

the extraction means extracts the tunica intima reference point based on the set threshold.

7. (Original) The medical imaging diagnostic apparatus according to claim 6, wherein the extraction means determines that the pixels having the brightness, when the absolute value of the brightness difference is smaller than the threshold value, are equivalent to a tunica intima.
8. (Previously Presented) The medical imaging diagnostic apparatus according to claim 1, wherein a plurality of brightness distribution lines running in the diameter direction of the blood vessel over in the blood flow direction are obtained and the tunica intima reference point is set based on the average brightness distribution line of the obtained respective distribution lines.
9. (Previously Presented) The medical imaging diagnostic apparatus according to claim 1, wherein a local maximal point closest to the lumen side, from the local maximal point previously set as the tunica intima reference point, is reset as a tunica intima reference point.
10. (Currently Amended) The medical imaging diagnostic apparatus according to claim 1, wherein the tunica intima is obtained based on the a color distribution of the Doppler signals of reflected echo signals.
11. (Original) The medical imaging diagnostic apparatus according to claim 10, wherein a binarization process is implemented, and the tunica intima is obtained based on the result of the binarization process.

12. (Currently Amended) The medical imaging diagnostic apparatus according to claim 1, wherein the setting means sets the coordinate of ~~the~~ a point having the maximum brightness value in relation to the brightness distribution in the thickness direction as a tunica externa reference point.

13. (Currently Amended) The medical imaging diagnostic apparatus according to claim 12, wherein:

the setting means sets ~~the~~ a second region of interest between the tunica intima reference point and the tunica externa reference point, and ~~the~~ a brightness difference between ~~the~~ an average brightness within the second region of interest and the brightness of the tunica externa reference point as the threshold value, and;

the extraction means extracts the tunica externa based on the set threshold value.

14. (Original) The medical imaging diagnostic apparatus according to claim 1, comprising signal processing means having a filter for emphasizing the contour of the pixel region being extracted by the extraction means.

15. (Currently Amended) The medical imaging diagnostic apparatus according to claim 1, wherein:

~~the image data is~~ extracted pixels correspond to 3-dimensional image data,
and

the extraction means extracts the tunica intima and the tunica externa on the 3-dimensional region, and measures the composite thickness of the tunica intima and a tunica media.

16. (Original) The medical imaging diagnostic apparatus according to claim 1, comprising:

a probe for transmitting/receiving ultrasonic waves to/from an object being examined;

a transmission/reception unit for providing driving signals to the probe and receiving the reflected echo signals;

an image construction unit for reconstructing ultrasound images based on the reflected echo signals; and

a display unit for displaying the ultrasonic images,

wherein the image data is the ultrasound image data obtained by transmitting/receiving ultrasonic waves to/from the object.

17. (Original) The medical imaging diagnostic apparatus according to claim 16, wherein a blood vessel wall on the side near the probe is set as a near wall and a blood vessel wall on the side far from the probe as a far wall, the measured value of the near wall and far wall are compared to each other, and the greater value thereof is set as the measurement value of the cross section.

18. (Currently Amended) The medical imaging diagnostic apparatus according to claim 1, ~~comprising wherein the~~ calculation means ~~for calculating~~ calculates the average value of the measured value in the region being extracted based on the extracted region.

19. (Currently Amended) The medical imaging diagnostic apparatus according to claim 1, comprising:

~~calculating means for calculating a maximum value or a minimum value in the extracted region, and;~~

a display unit for displaying the calculated value,

wherein the calculating means calculates a maximum value or a minimum value in the extracted region, and

wherein the location of the maximum value or the minimum value in the extracted region is marked on the display unit.

20. (Currently Amended) The medical imaging diagnostic apparatus according to claim 1, comprising:

~~calculating means for calculating the distance between the boundaries of an inner wall of the tunica intima and an inner wall of the tunica externa, and;~~

display means for displaying the composite thickness of the tunica intima and tunica media of the blood vessel based on the distance.

21. (Cancelled).

22. (Cancelled).

23. (Currently Amended) A medical imaging diagnostic apparatus comprising:

imaging means for obtaining image data related to a blood vessel of an object being examined;

Doppler imaging means for obtaining color Doppler image data related to the blood vessel;

brightness distribution acquisition means for acquiring the brightness distribution in the thickness direction of the blood vessel wall of the color Doppler image data;

~~setting means for setting the local maximal point, out of the local maximal points appearing in the brightness distribution, having the maximum brightness as~~
tunica intima reference point and the tunica externa reference point based on the brightness distribution;

~~extraction means for extracting the pixels, in relation to the respective pixels within the setting range including with respect to each pixel in the setting range including the tunica intima reference point or the tunica externa reference point,~~
wherein the brightness belongs to the setting range; and

~~calculating means for calculating the distance between the boundary of the lumen and the tunica intima being obtained based on the color information in the blood vessel wall side in the region formed by the pixels being extracted based on the tunica intima reference point and the boundary in the lumen side of in the region formed by the pixels being extracted based on the tunica externa reference point.~~

24. (Currently Amended) A medical imaging diagnostic method comprising:

~~extracting the tunica intima and the tunica externa of the blood vessel based on the brightness value of the image data;~~

~~measuring a composite thickness of the tunica intima and the tunica media of the blood vessel on a region of the tunica intima and a region of the tunica externa,~~
and

~~setting reference points of the tunica intima or the tunica externa of the blood vessel based on the brightness value of the respective regions and for setting a threshold of a subtraction of the extracted brightness value of the image data from the brightness value of the reference points,~~

~~wherein in the composite thickness of the tunica intima and the tunica media of the blood vessel is measured based on their reference points and the threshold.~~
acquiring a brightness distribution in the thickness direction of a blood vessel wall in a tomogram with regard to the blood vessel,

setting a tunica intima reference point and a tunica externa reference point based on the brightness distribution,

extracting pixels, with respect to each pixel in a setting range including the tunica intima reference point or the tunica externa reference point, wherein the brightness belongs to the setting range, and

calculating a distance between a boundary in the blood vessel wall side in a region formed by the pixels being extracted based on the tunica intima reference point and a boundary in the lumen side in a region formed by the pixels being extracted based on the tunica externa reference point.